

1. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

Pringles wants to add 42 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

- A. About 21 percent
 - B. About 3 percent
 - C. About 12 percent
 - D. About 19 percent
 - E. None of the above
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2. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

Pringles wants to add 33 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

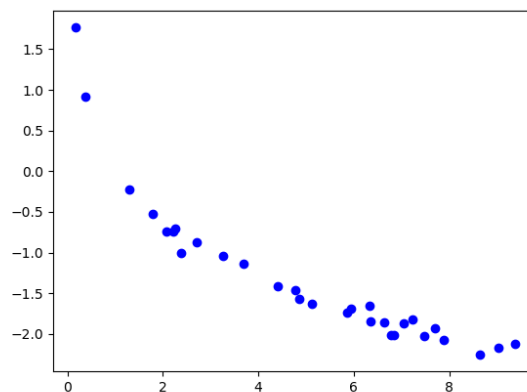
- A. About 3 percent
 - B. About 10 percent
 - C. About 15 percent
 - D. About 16 percent
 - E. None of the above
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3. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 6 many cases reported, but the number of confirmed cases has doubled every 4 days. How long will it be until there are at least 10000 confirmed cases?

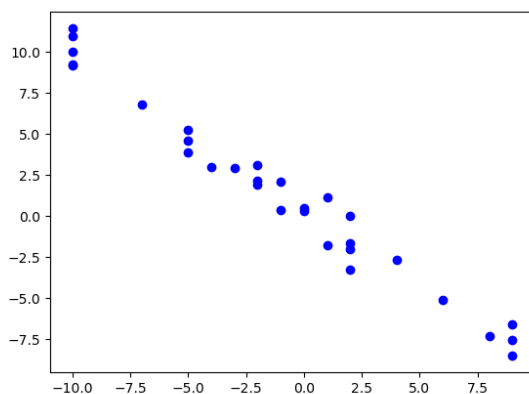
- A. About 43 days
 - B. About 15 days
 - C. About 30 days
 - D. About 14 days
 - E. There is not enough information to solve the problem.
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4. Determine the appropriate model for the graph of points below.



- A. Logarithmic model
 - B. Exponential model
 - C. Non-linear Power model
 - D. Linear model
 - E. None of the above
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5. Determine the appropriate model for the graph of points below.



- A. Non-linear Power model
- B. Linear model
- C. Exponential model
- D. Logarithmic model
- E. None of the above

6.

7. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 18 liter 31 percent solution of chemical χ using two different solution percentages of chemical χ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 15 percent and 37 percent solutions, what was the amount she used of the 37 percent solution?

- A. 9.00liters
- B. 7.93liters
- C. 4.91liters
- D. 13.09liters
- E. There is not enough information to solve the problem.

8. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 5 many cases reported, but the number of confirmed cases has tripled every 4 days. How long will it be until there are at least 10000 confirmed cases?

- A. About 31 days
 - B. About 15 days
 - C. About 28 days
 - D. About 14 days
 - E. There is not enough information to solve the problem.
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9. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 16 liter 26 percent solution of chemical χ using two different solution percentages of chemical χ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 20 percent and 38 percent solutions, what was the amount she used of the 38 percent solution?

- A. 10.67liters
 - B. 8.00liters
 - C. 5.26liters
 - D. 5.33liters
 - E. There is not enough information to solve the problem.
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10. For the information below, construct a linear model that describes the total time T spent on the path in terms of the distance of a particular part of the path *if we know that all parts of the path are equal length.*

A bicyclist is training for a race on a hilly path. Their bike keeps track of their speed at any time, but not the distance traveled. Their speed traveling up a hill is 6 mph, 10 mph when traveling down a hill, and 8 mph when traveling along a flat portion.

- A. $24.000D$
- B. $480.000D$
- C. $0.392D$
- D. The model can be found with the information provided, but isn't options 1-3
- E. The model cannot be found with the information provided.

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11. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

Pringles wants to add 26 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

- A. About 8 percent
- B. About 3 percent
- C. About 12 percent
- D. About 13 percent
- E. None of the above

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12. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

Pringles wants to add 38 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

- A. About 19 percent

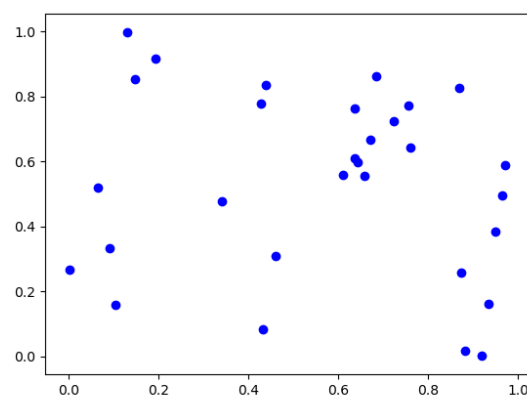
- B. About 3 percent
- C. About 11 percent
- D. About 17 percent
- E. None of the above

13. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 6 many cases reported, but the number of confirmed cases has doubled every 2 days. How long will it be until there are at least 1000 confirmed cases?

- A. About 15 days
- B. About 6 days
- C. About 11 days
- D. About 5 days
- E. There is not enough information to solve the problem.

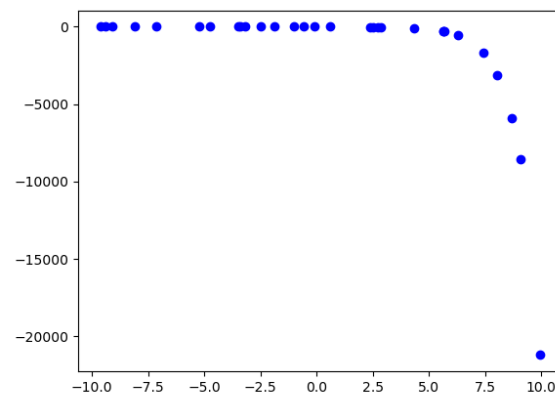
14. Determine the appropriate model for the graph of points below.



- A. Logarithmic model
- B. Non-linear Power model

- C. Linear model
- D. Exponential model
- E. None of the above

15. Determine the appropriate model for the graph of points below.



- A. Linear model
- B. Non-linear Power model
- C. Logarithmic model
- D. Exponential model
- E. None of the above

16. For the scenario below, model the rate of vibration (cm/s) of the string in terms of the length of the string. Then determine the variation constant k of the model (if possible). The constant should be in terms of cm and s.

The rate of vibration of a string under constant tension varies based on the type of string and the length of the string. The rate of vibration of string ω decreases as the quartic length of the string increases. For example, when string ω is 4 mm long, the rate of vibration is 29 cm/s.

- A. $k = 1132.81$

- B. $k = 0.74$
 - C. $k = 7424.00$
 - D. $k = 0.11$
 - E. None of the above.
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17. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 25 liter 34 percent solution of chemical χ using two different solution percentages of chemical χ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 15 percent and 45 percent solutions, what was the amount she used of the 15 percent solution?

- A. 11.27liters
 - B. 12.50liters
 - C. 9.17liters
 - D. 15.83liters
 - E. There is not enough information to solve the problem.
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18. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 4 many cases reported, but the number of confirmed cases has quadrupled every 2 days. How long will it be until there are at least 1000000 confirmed cases?

- A. About 18 days
- B. About 12 days
- C. About 10 days
- D. About 25 days
- E. There is not enough information to solve the problem.

19. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 15 liter 9 percent solution of chemical χ using two different solution percentages of chemical χ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 7 percent and 28 percent solutions, what was the amount she used of the 28 percent solution?

- A. 2.11liters
 - B. 13.57liters
 - C. 1.43liters
 - D. 7.50liters
 - E. There is not enough information to solve the problem.
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20.

21. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

Pringles wants to add 45 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

- A. About 22 percent
 - B. About 4 percent
 - C. About 20 percent
 - D. About 13 percent
 - E. None of the above
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22. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

Pringles wants to add 41 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

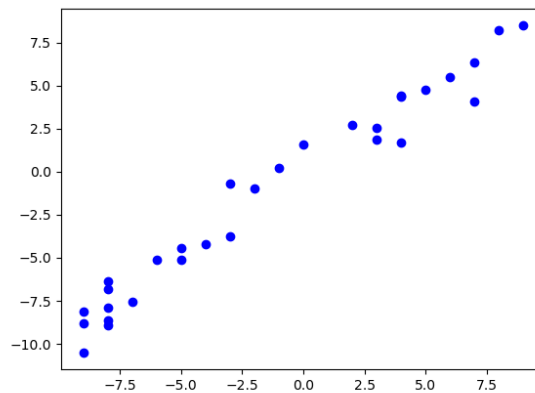
- A. About 20 percent
 - B. About 12 percent
 - C. About 14 percent
 - D. About 19 percent
 - E. None of the above
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23. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 6 many cases reported, but the number of confirmed cases has tripled every 4 days. How long will it be until there are at least 10000 confirmed cases?

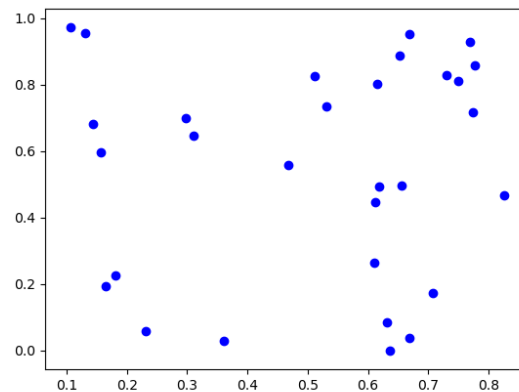
- A. About 14 days
 - B. About 30 days
 - C. About 13 days
 - D. About 28 days
 - E. There is not enough information to solve the problem.
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24. Determine the appropriate model for the graph of points below.



- A. Linear model
- B. Logarithmic model
- C. Exponential model
- D. Non-linear Power model
- E. None of the above

25. Determine the appropriate model for the graph of points below.



- A. Logarithmic model
- B. Non-linear Power model
- C. Linear model
- D. Exponential model

E. None of the above

26. For the information below, construct a linear model that describes the total time T spent on the path in terms of the distance of a particular part of the path *if we know that all parts of the path are equal length.*

A bicyclist is training for a race on a hilly path. Their bike keeps track of their speed at any time, but not the distance traveled. Their speed traveling up a hill is 6 mph, 11 mph when traveling down a hill, and 8 mph when traveling along a flat portion.

A. $25.000D$

B. $528.000D$

C. $0.383D$

D. The model can be found with the information provided, but isn't options 1-3

E. The model cannot be found with the information provided.

27. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 15 liter 14 percent solution of chemical χ using two different solution percentages of chemical χ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 9 percent and 26 percent solutions, what was the amount she used of the 9 percent solution?

A. 4.41liters

B. 4.66liters

C. 7.50liters

D. 10.59liters

E. There is not enough information to solve the problem.

28. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 6 many cases reported, but the number of confirmed cases has quadrupled every 3 days. How long will it be until there are at least 1000000 confirmed cases?

- A. About 14 days
- B. About 27 days
- C. About 37 days
- D. About 15 days
- E. There is not enough information to solve the problem.

29. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 24 liter 11 percent solution of chemical χ using two different solution percentages of chemical χ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 10 percent and 40 percent solutions, what was the amount she used of the 40 percent solution?

- A. 12.00liters
- B. 0.80liters
- C. 21.49liters
- D. 23.20liters
- E. There is not enough information to solve the problem.

30. For the scenario below, find the variation constant k of the model (if possible).

In an alternative galaxy, the square of the time, T (Earth years), required for a planet to orbit Sun χ increases as the cube of the distance, d (AUs), that the planet is from Sun χ increases. For example, when Ea's average distance from Sun χ is 5, it takes 73 Earth days to complete an orbit.

- A. $k = 666125.000$
 - B. $k = 42.632$
 - C. $k = 4.997$
 - D. $k = 4.028$
 - E. Unable to compute the constant based on the information given.
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